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STATISTICAL TECHNIQUES FOR SIGNAL PROCESSING(U)
PENNSYLVANIA UNIV PHILADELPHIA S A KASSAM 30 MAY 85
AFOSR-TR-86-0172 AFOSR-82-0022

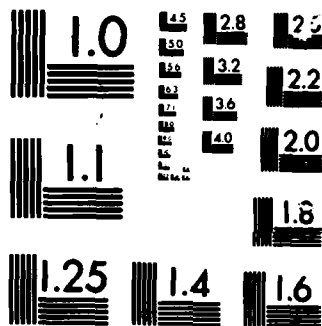
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1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS (2)		
2a. SECURITY CLASSIFICATION AUTHORITY ---			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release, distribution unlimited		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A					
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S) AFOSR-TR- 86-0172		
6a. NAME OF PERFORMING ORGANIZATION University of Pennsylvania		6b. OFFICE SYMBOL (If applicable)		7a. NAME OF MONITORING ORGANIZATION AFOSR	
6c. ADDRESS (City, State and ZIP Code) Philadelphia, PA 19104				7b. ADDRESS (City, State and ZIP Code) Bldg. 410 Bolling AFB, D.C. 20332-6448	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION AFOSR		8b. OFFICE SYMBOL (If applicable) NM		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER AFOSR-82-0022	
8c. ADDRESS (City, State and ZIP Code) Bldg. 410 Bolling AFB, D.C. 20332-6448		10. SOURCE OF FUNDING NOS.			
		PROGRAM ELEMENT NO. 61102F		PROJECT NO. 2304	TASK NO. A5
11. TITLE (Include Security Classification) Statistical Techniques for Signal Processing		WORK UNIT NO.			
12. PERSONAL AUTHOR(S) S. A. Kassam					
13a. TYPE OF REPORT Interim		13b. TIME COVERED FROM 1 Nov 84 to 28 May 85		14. DATE OF REPORT (Yr., Mo., Day) 30 May 1985	
				15. PAGE COUNT 4	
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB. GR.	nonlinear smoothers, quantization		
XXXXXX	XXXXXXXXXX	XXXX			
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>This report summarizes the progress made since November 1, 1984 under this grant. The primary contributions have been on nonlinear smoothers, quantization, and nonparametric and robust detection and filtering. We will continue efforts in these directions in the second year.</p>					
DTIC FILE COPY					
DTIC ELECTED APR 29 1986					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input checked="" type="checkbox"/> DTIC USERS <input type="checkbox"/>			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Brian W. Woodruff, Maj, USAF			22b. TELEPHONE NUMBER (Include Area Code) (202)767-5027		22c. OFFICE SYMBOL NM

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EDITION OF 1 JAN 73 IS OBSOLETE.

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

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AFOSR-TR. 86-0172

STATISTICAL TECHNIQUES FOR SIGNAL PROCESSING

Research Progress and Forecast Report

AFOSR Grant AFOSR 82-0022

Principal Investigator: S.A. Kassam

Grant Year: November 1, 1984 - October 31, 1985

Report Date: May 28, 1985

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This report summarizes the progress we have made since November 1, 1984 under AFOSR Grant 82-0022 for continuing research on "Statistical Techniques for Signal Processing". It also summarizes our objectives and anticipated results for the second year of the above grant.

The progress made so far can be inferred from the list of publications and of items in preparation for publication since November 1, 1984, [1]-[10] on page 3. The invited paper [1] is a comprehensive survey of robust signal processing schemes. In [2] a new coding scheme for binary images has been described. In the main area of our research, that of nonlinear smoothers and filters based on generalizations of medians and other robust estimators, references [3]-[6] contain our recent results and interpretations. References [7] and [8] are on the subject of optimum quantization of data and coefficients in estimation and detection problems. Finally, [9] and [10] contain recent results on nonparametric and robust detection and filtering. Those of the listed papers which have not yet been sent to AFOSR will be mailed in a package within the next three months.

In the second year of the current grant we will continue to focus on the important area of nonlinear filters and smoothers based on robust estimators. We plan to study in particular the class of moving-window (non-recursive) filters which utilize in a general way both temporally-ordered and rank-ordered data weighted by appropriately designed weighting matrices. In addition, we will continue our statistical characterizations of the edge-preservation and noise-rejection properties of such filters, and consider also recursive versions. The primary application area to which we will attempt to apply promising results will be that of image

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restoration and also that of constant-false-alarm-rate radar processing.

As a secondary activity we expect to be able to continue our research on new methods for nonparametric detection and robust signal processing.

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LIST OF PUBLICATIONS

1. S.A. Kassam and H.V. Poor, "Robust Techniques for Signal Processing: A Survey", Proc. IEEE (Invited Paper), Vol. 73, pp. 433-481, March 1985.
2. I.H. Song and S.A. Kassam, "A Method for Binary Image Data Compression and Coordinate Representation", Proc. 1985 Conf. Information Sciences and Systems, (Johns Hopkins), pp. - , March 1985. (Being prepared for submission to IEEE Trans. Pattern Analysis and Machine Intelligence).
3. S.R. Peterson and S.A. Kassam, "Edge Preserving Signal Enhancement Using Generalizations of Order Statistic Filtering", Proc. 1985 IEEE Conf. Acoustics, Speech and Signal Processing, pp. - , April 1985.
4. S.A. Kassam, "A Class of Nonlinear Filters for Edge-Preserving Smoothing", 1985 IEEE International Symposium on Information Theory Abstracts, p. , June 1985.
5. Y.H. Lee and S.A. Kassam, "Generalized Median Filtering and Related Nonlinear Filtering Techniques", IEEE Trans. Acoustics, Speech and Signal Processing, Vol. ASSP-33, pp. - , June 1985.
6. S.R. Peterson, Y.H. Lee and S.A. Kassam, "Spectral Performance Characterizations of Some Generalized Median Filters", IEEE Trans. Communications, (submitted for Publication).
7. C.T. Chen and S.A. Kassam, "Generalized Quantization of Coefficients for FIR Wiener and Matched Filters", IEEE Trans. Communications (Being revised for Publication).
8. S.A. Kassam, "Optimum Data Quantization in Signal Detection". Chapter in Advances in Communications and Networks (Blake and Poor, Eds) Springer-Verlag, 1985 (In Press).
9. S.A. Kassam, "Hard-Limiting and Nonparametric Detection of Narrowband Signals", IEEE Trans. Information Theory (Submitted for Publication).
10. S.A. Kassam, "Bounded p-Point Classes of Densities in Robust Hypothesis Testing and Filtering", IEEE Trans. Information Theory (Submitted for Publication).

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